No. 0092-45-19

Faster Route Permitting for Oversize/Overweight Vehicles

from research to reality

BRIEF

RESEARCH DEVELOPMENT & TECHNOLOGY TRANSFER

Before an oversize or overweight vehicle can travel legally on Wisconsin highways, its operator must first obtain a state permit from the Department of Transportation. The WisDOT employees who issue the permit must evaluate the proposed route for potential hazards such as roads that are too narrow, bridges without adequate vertical clearance, areas that are congested from special events, such as football games or seasonal tourist traffic, and roadbeds that are unstable during the spring thaw. In addition, they must ensure that heavy loads can travel safely without damaging the state's bridges.

This research project was aimed at providing better service to operators by simplifying and more fully automating route check procedures. The primary tool was a Geographic Information Systems (GIS) software program that the research team constructed. The project takes advantage of the state's highway linear location reference system and link/site topological network to manage route restrictions, generate new routes and test proposed routes.

What's the Problem?

Each year the number of oversize/overweight permit requests increases by about 6%. In addition, as new roads and bridges are built and urban areas become more congested, the route approval process—requiring the use of paper documents such as forms, maps and faxes—becomes increasingly complex. The result has been longer turnaround times for permit requests. Compounding the problem is the need to maintain a logical network of bridge locations for the "route-check" program that WisDOT's Division of Transportation Infrastructure Development currently uses to analyze the impact of overweight vehicles on Wisconsin's bridges. The database of bridge locations used by the route-check program is a non-normalized flat file that is difficult to work with and update; and the same data has to be entered more than once. This project was designed to find improvements or alternatives to the route-check program that reduce the complexity and time required for permitting.

Research Objectives

The primary objective of the project was to develop a prototype GIS software application that automatically generates routes for oversize/overweight vehicles. One obstacle is the way bridges are spatially related to the roadway in the route-check database. To use this vital data source, the researchers set additional objectives of evaluating the usability of the bridge location reference from other data sources, evaluating the logic that is used to code the bridges, and developing a GIS application to manage the bridge data for the new route-generating application to use. The final objective was to document a procedure under which a permanent route-generating application could be developed.

Study Results

The prototype oversize-overweight system was constructed using GIS spatial analysis functions. It was designed to either calculate the best possible route between two points or to test a suggested route, such as a motor carrier would submit. The system works by incrementally eliminating sections of the roadway from consideration for the route.

- First it eliminates sections that would be restricted, for example because of anticipated road construction, for anytime during the two-week period the permits would be valid.
- Next it eliminates sections that are too narrow for the vehicle.
- Finally, the system calculates the shortest route possible within the remaining sections.
- If the vehicle is overweight, however, the system must add a step, which is to check to see whether all of the bridges on the route are structurally approved for overweight vehicles. If any bridge isn't approved, the system generates a new route. This iterative process continues until the system finds a route free of unapproved bridges.

Investigators
Teresa Adams, Suphawut Malaikrisanachalee, Carola Blazquez, Alan Vonderohe, University of Wisconsin Madison

The Wisconsin Department of Transportation

The new WisDOT oversize/ overweight permit system will enable operators to apply for, pay for and receive permits online.

"This research really got the ball rolling in terms of correcting several problems with our existing permit system. It will help the Division of Motor Vehicles issue permits faster and, most important, assure that we are protecting our bridges and highways."

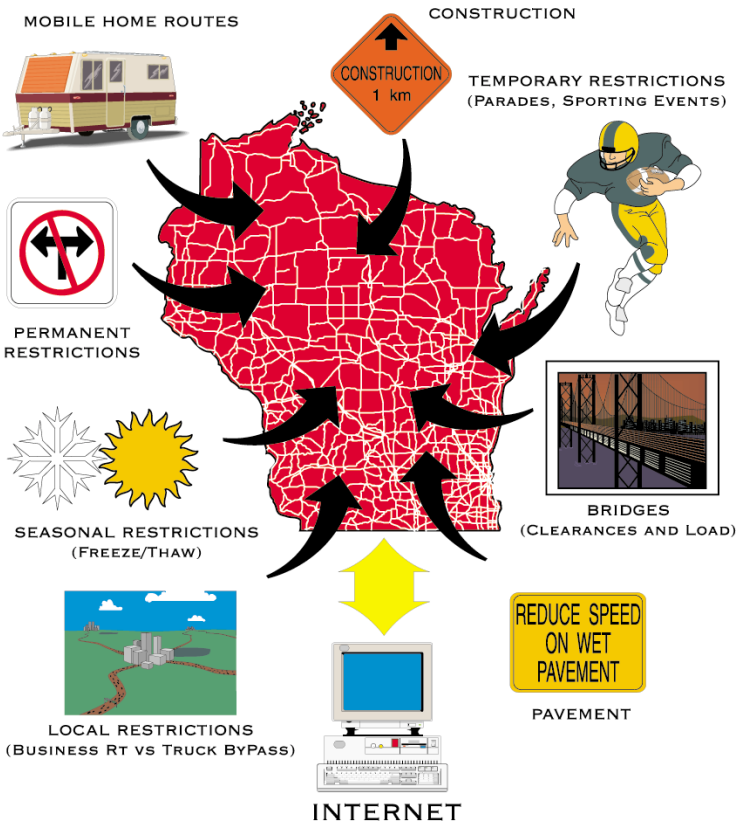
- Stan Woods, Structures Development Chief, WisDOT Bureau of Structures

Wisconsin Department of Transportation
RD&T Program
4802 Sheboygan Ave.
Madison, WI 53707
Nina McLawhorn
Research Administrator
608-266-3199

GIS-Based Oversize/ Overweight Vehicle Routing System

0092-45-19

May 2002



The researchers also developed a program to evaluate the bridge data that the oversize/overweight system uses.

- First the program found bridges, which were identified as link/site address data points, in the bridge log. The bridge log contains data for the limitations Wisconsin bridges pose for oversize and overweight vehicles.
- Then the program compared this data with similar data in the state trunk network, which the oversize/overweight program uses to plan routes.

The program found discrepancies, such as bridges that exist in one set of data but not the other and bridges that are out of sequence. These discrepancies will be resolved so the state trunk network can be used as a reliable source of data for the final oversize/overweight permit system.

Further Research and Implementation

An independent contractor, CW Beilfuss & Associates, Inc. of Downers Grove, Illinois, is currently designing a system for WisDOT's Division of Motor Vehicles to fully automate an oversize/ overweight permit system. This research project helped shape the specification for the new system. Especially useful was the identification of six types of discrepancies between the bridge log and the state trunk network.

Benefits

When the new system is fully operational, customers who have a computer with an Internet connection (and a WisDOT-supplied password) will be able to apply for, pay for and receive permits online. In most cases, the new system will generate a route, issue a route and accept payment automatically and instantaneously. Only loads that are unusually large or heavy will require DOT processors to intercede. In addition to the Internet interface provided to the public, the system will provide a sophisticated interface for WisDOT permit processors.

For more information, contact:

Stan Woods: stan.woods@dot.state.wi.us or
Teresa Adams: teresa.adams@dot.state.wi.us